Name____

A2CC: Complex Numbers

Do Now:

1. $625^{\frac{3}{4}}$

2. $\left(3ab^2c\right)\left(\frac{2a^2b}{c^3}\right)^{-1}$

3. Solve: $x^2+1=0$

Definition: The imaginary unit, *i*, is defined as $\sqrt{-1}$. Therefore:

$i^0 =$	$i^4 =$
$i^1 =$	$i^5 =$
$i^2 =$	$i^6 =$
$i^3 =$	$i^7 =$

We can easily simplify any power of *i*. We do this by:

Examples:

Simplify each.

1. i^{20}

3. i^{78}

2. i^{39}

4. $3i^{11} \bullet 2i^5$

Property of negative square roots:

$\sqrt{-c} = \sqrt{-1c} = \sqrt{-1}\sqrt{c} = i\sqrt{c}$

Examples:

Simplify each.

5. $\sqrt{-25}$

6. $\sqrt{-32}$

7. $-\sqrt{25} - \sqrt{-147}$

8. $\sqrt{-128}$

9. $\sqrt{-9} + \sqrt{-16}$

Definition:
A number of the form $a + bi$, where a and b are real numbers and $i = \sqrt{-1}$ is called a **complex number.** a is called the **real part** and bi is called the **imaginary part**. A complex number written with the real part first and the imaginary part last is in **standard form.**

Examples:

Perform the operations and put your answers in standard form.

10. $(-1+2i)+(5-3i)$

11. $(-11-40i)-(2+10i)$

12. $10i(6-8i)$

13. $(2+5i)(3-15i)$

14. $\sqrt{-4} \cdot \sqrt{-10} \cdot \sqrt{36}$

15. $(5-\sqrt{-27})-(9+\sqrt{-108})$

16. $(-2+6i)(3-2i)$

17. $(4+i)(-5-3i)$

18. Simplify: $5i^{18}+7i^{25}+2i^{28}+6i^{43}$

19. Determine the result in simplest $a+bi$ form:

$$(5+2i)(-3+i)+4i(2+3i)$$

Definition:

$a+bi$ and $a-bi$ are called **complex conjugates.** So, $(a+bi)(a-bi)=$____________